

WHAT IS CLAIMED IS:

1 1. A wavelength division multiplexing optical  
2 repeating transmission method for performing repeating  
3 transmission of a wavelength multiplexed optical signal  
4 along an optical transmission line interconnecting a  
5 terminal apparatus for transmission and a terminal  
6 apparatus for reception and having a repeating interval  
7 divided by a plurality of repeating apparatus, comprising  
8 steps executed by each of said repeating apparatus disposed  
9 at end points of the divisional repeating intervals, the  
10 steps including:  
11 a first dispersion compensation step of compensating  
12 for a dispersion included in the wavelength multiplexed  
13 optical signal having propagated in the divisional  
14 repeating interval on the terminal apparatus side for  
15 transmission so as to be included within a tolerance set  
16 in advance;  
17 an optical add/drop multiplexing step of performing  
18 an optical add/drop multiplexing process for each of  
19 wavelength components of the wavelength multiplexed  
20 optical signal for which the dispersion compensation  
21 process has been performed at the first dispersion  
22 compensation step; and  
23 a second dispersion compensation step of performing  
24 a dispersion compensation process with an over  
25 compensation amount for the wavelength multiplexed optical

26 signal for which the optical add/drop multiplexing process  
27 has been performed at the optical add/drop multiplexing  
28 step such that the sum of the compensation amount at the  
29 second dispersion compensation step and the compensation  
30 amount at the first dispersion compensation step exhibits  
31 a predetermined proportion to the dispersion appearing  
32 in the divisional repeating interval on the terminal  
33 apparatus side for transmission and transmitting a  
34 resulting signal to the divisional repeating interval on  
35 the terminal apparatus side for reception;

36 the ratio of the over compensation amount at the  
37 second dispersion compensation step to the sum of the  
38 dispersion compensation amounts at the first and second  
39 dispersion compensation steps being set so as to gradually  
40 vary together with the transmission distance from said  
41 terminal apparatus for transmission at which said  
42 repeating apparatus is disposed on said light transmission  
43 line.

1 2. The wavelength division multiplexing optical  
2 repeating transmission method as claimed in claim 1,  
3 wherein the predetermined proportion for performing the  
4 dispersion compensation process by the over compensation  
5 amount at the second dispersion compensation step is set  
6 so as to gradually increase together with the transmission  
7 distance from said terminal apparatus for transmission  
8 at which of said repeating apparatus is disposed on said

9 light transmission line.

1 3. The wavelength division multiplexing optical  
2 repeating transmission method as claimed in claim 1,  
3 wherein the predetermined proportion for performing the  
4 dispersion compensation process of the over compensation  
5 amount at the second dispersion compensation step is set  
6 so as to gradually decrease together with the transmission  
7 distance from said terminal apparatus for transmission  
8 at which of said repeating apparatus is disposed on said  
9 light transmission line.

1 4. The wavelength division multiplexing optical  
2 repeating transmission method as claimed in claim 1,  
3 further comprising a residual dispersion compensation step  
4 executed by each of said repeating apparatus of  
5 compensating, where a residual dispersion appears in an  
6 optical signal of each wavelength before and after the  
7 optical add/drop multiplexing process at the optical  
8 add/drop multiplexing step, for the residual dispersion.

1 5. The wavelength division multiplexing optical  
2 repeating transmission method as claimed in claim 1,  
3 further comprising a transmission side dispersion  
4 compensation step of performing a dispersion compensation  
5 process which satisfies a transmission condition for a  
6 wavelength multiplexed optical signal to be transmitted

7 in said terminal apparatus for transmission.

1 6. The wavelength division multiplexing optical  
2 repeating transmission method as claimed in claim 5,  
3 wherein the transmission condition relates to at least  
4 one of the kind of fiber, the transmission distance and  
5 the bit rate.

1 7. A repeating apparatus for a wavelength division  
2 multiplexing optical repeating transmission system  
3 wherein a terminal apparatus for transmission and a  
4 terminal apparatus for reception are interconnected by  
5 an optical transmission line whose repeating interval is  
6 divided by a plurality of repeating apparatus to perform  
7 repeating transmission of a wavelength multiplexed optical  
8 signal, comprising:

9 a first dispersion compensation section for  
10 compensating for a dispersion included in the wavelength  
11 multiplexed optical signal having propagated in the  
12 divisional repeating interval on the terminal apparatus  
13 side for transmission so as to be included within a tolerance  
14 set in advance;

15 an optical add/drop multiplexing section for  
16 performing an optical add/drop multiplexing process for  
17 each of wavelength components of the wavelength  
18 multiplexed optical signal for which the dispersion  
19 compensation process has been performed in said first

20 dispersion compensation section; and  
21 a second dispersion compensation section for  
22 performing a dispersion compensation process with an over  
23 compensation amount for the wavelength multiplexed optical  
24 signal for which the optical add/drop multiplexing process  
25 has been performed by said optical add/drop multiplexing  
26 section such that the sum of the compensation amount by  
27 said second dispersion compensation section and the  
28 compensation amount by said first dispersion compensation  
29 section exhibits a predetermined proportion to the  
30 dispersion appearing in the divisional repeating interval  
31 on the terminal apparatus side for transmission.

1 8. The repeating apparatus as claimed in claim 7,  
2 wherein said second dispersion compensation section  
3 gradually increases the predetermined proportion for  
4 performing the dispersion compensation process by the over  
5 compensation amount together with the transmission  
6 distance from said terminal apparatus for transmission  
7 at which said repeating apparatus is disposed on said light  
8 transmission line.

1 9. The repeating apparatus as claimed in claim 7,  
2 wherein said second dispersion compensation section  
3 gradually decreases the predetermined proportion for  
4 performing the dispersion compensation process by the over  
5 compensation amount together with the transmission

6 distance from said terminal apparatus for transmission  
7 at which of said repeating apparatus is disposed on said  
8 light transmission line.

1 10. The repeating apparatus as claimed in claim 7,  
2 wherein at least one of said first and second dispersion  
3 compensation sections is formed from a variable dispersion  
4 compensation apparatus which can vary a set value for a  
5 dispersion compensation amount.

1 11. The repeating apparatus as claimed in claim 7,  
2 further comprising a dispersion slope compensation  
3 apparatus for compensating for a dispersion slope  
4 regarding a wavelength multiplexed optical signal to be  
5 inputted to said optical add/drop multiplexing section  
6 or a wavelength multiplexed optical signal outputted from  
7 said optical add/drop multiplexing section of a different  
8 one of the plural repeating apparatus.

1 12. The repeating apparatus as claimed in claim 7,  
2 further comprising a dispersion compensator for  
3 compensating for a residual dispersion amount with respect  
4 to a dispersion compensation amount in said first or second  
5 dispersion compensation section for each optical signal  
6 of an individual channel added/dropped by said optical  
7 add/drop multiplexing section.